United States Patent

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[54] **ORTHODONTIC UPRIGHTING SPRINGS FOR TIPPING AND UPRIGHTING TEETH**
3 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** ..... **32/14 A**
[51] **Int. Cl.** **A61c 7/00**
[50] **Field of Search** ..... 32/14 A

[56]

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ABSTRACT: An improved spring assembly is provided for use in orthodontia and which serves to carry out the principle of Begg's Orthodontic Technique in the free tipping and pure uprighting of the canines and first or second premolars. The assembly of the invention includes a spring which is configured into a combined helical and Archimedes spiral, and which is used in conjunction with a slotted bracket mounted on the tooth, and the usual arch wire, with the arch wire being held in the slot of the bracket by one of the actuating arms of the spring.

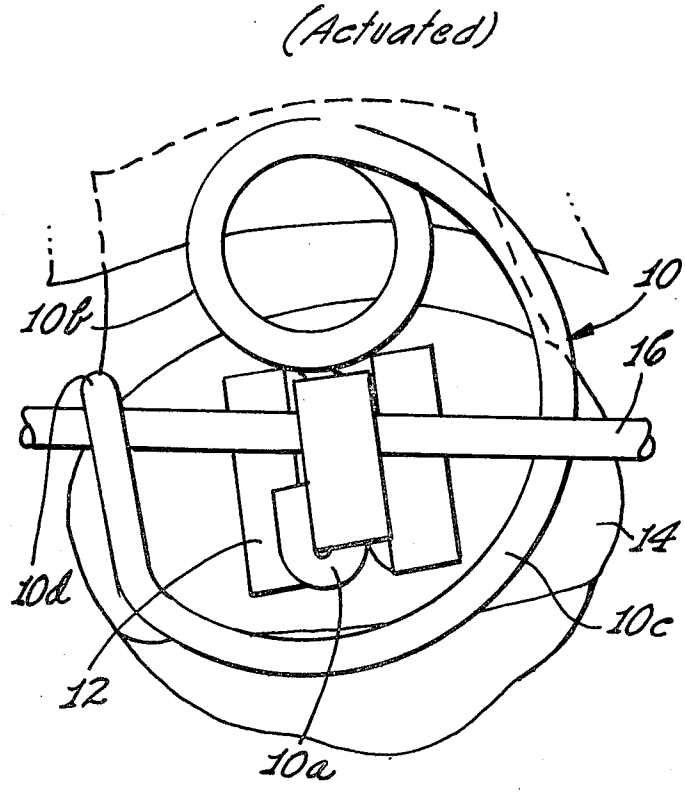


Fig. 1A (Actuated)

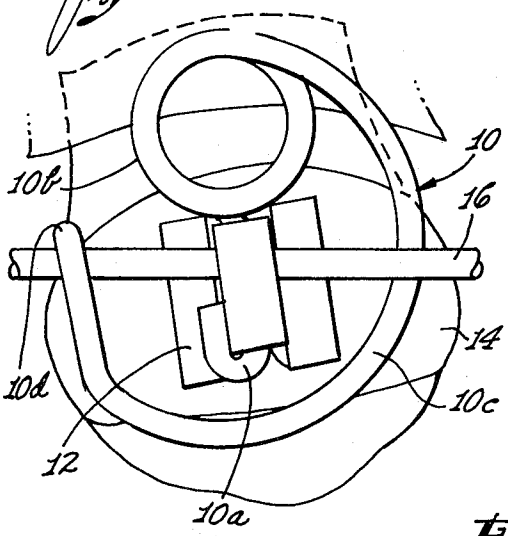


Fig. 1B (Finished)

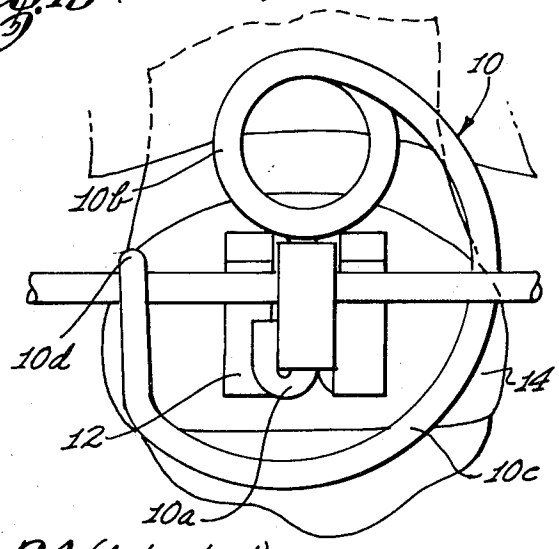
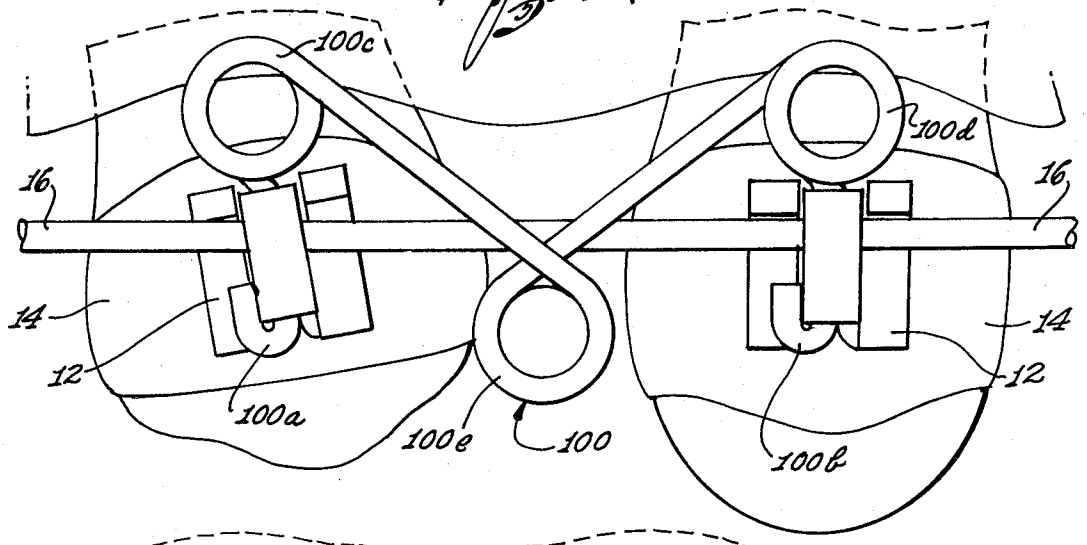


Fig. 2A (Actuated)



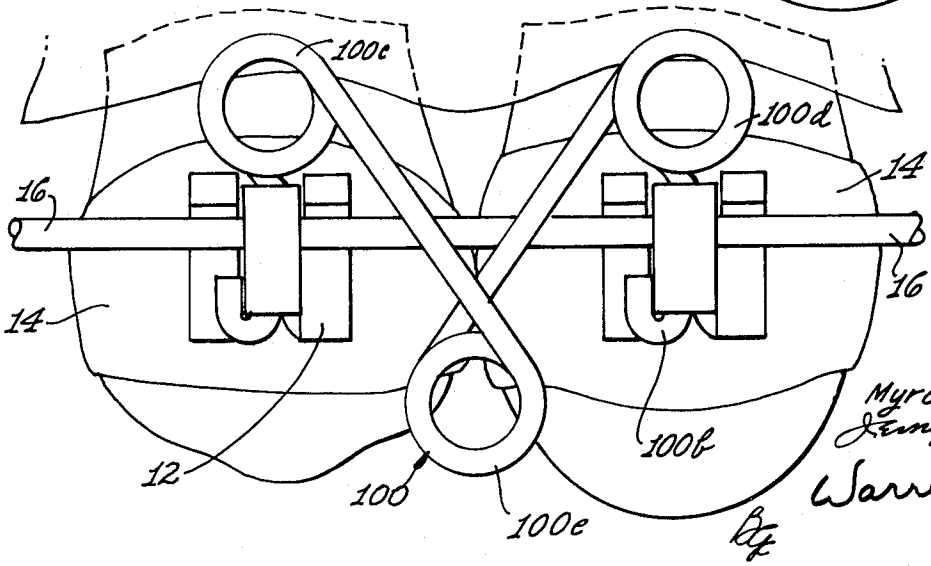


Fig. 2B (Finished)

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ORTHODONTIC UPRIGHTING SPRINGS FOR TIPPING AND UPRIGHTING TEETH

BACKGROUND OF THE INVENTION

The spring assembly of the present invention carries out Begg's Orthodontic Technique principles of free tipping and pure uprighting to the canines and first or second premolars, as mentioned above. The uprighting springs which are presently on the market do not provide true uprighting movements. Such prior art springs rotate the crown of the tooth, and they cause transverse motion while they are uprighting and bringing the roots of the canines and second premolars together. This transverse motion creates a space opening between the canine and the second premolar marginal ridges which have already been closed in the second stage of the Begg Technique.

The uprighting assembly of the present invention, on the other hand, is predicated upon advanced engineering principles to as to allow the teeth to upright in a true uprighting motion. The stress of the spring rotation in the spring assembly to be described is placed in such a manner that the pivot about which the tooth turns is in the longitudinal axis of the tooth which does, as Begg intended, move the roots of the teeth together, leaving the crowns touching at the end of the second stage of the Begg Technique where so much time has been consumed in the prior art practices in closing this space.

The pure uprighting movement achieved in the practice of the present invention saves many months of chair time insofar as the patient and the practicing orthodontist are concerned. In fact, actual in viva observation studies have shown that the units constructed in accordance with the invention take approximately one-third to one-half of the time formerly required when the prior art uprighting springs were employed.

The actuating arm of a dual type of spring assembly, representing one embodiment of the invention to be described, engages the arch wire in a manner such that it does not overlap, touch or slide into the arm of the spring on the opposing tooth. There is free movement of the tooth in a pure uprighting direction, and there is no interference with the adjacent teeth. Moreover, the spring assembly of the present invention is more hygienic than the prior art devices, in that there is less food entrapment around the uprighting spring assembly of the invention. This is because the arms of the uprighting springs of the invention do not come together in the open space between the second premolars and the canines, as in the case with the prior art arrangements.

The uprighting springs now in use must be ligated, or otherwise attached to the arc wire, and they also have a tendency to push the arch wire out of the associated tooth bracket. The uprighting spring assembly of the present invention, on the other hand, holds the arch wire into the slot of the accompanying bracket so that ligating is unnecessary, and this feature results in time saving to the orthodontist.

A further advantage of the spring assembly of the present invention is that it is universal and may be used on either side of the arch, to the right or left, and in both the upper and lower arch. Moreover, no marking or measuring is required for fitting the assembly. All that is needed is one simple bend of an arm at one end of the spring for securing the spring into the bracket, and hooking the other end of the spring over the arch wire when a single unit is used, or bending the arm at the end of the second spring into its tooth bracket, when a dual unit is used. As mentioned above, the combination of the helical and Archimedes spiral in the configuration of the spring assembly of the invention provides a more continuous action than any uprighting spring presently in existence, and in a pure and true uprighting motion.

The uprighting spring of the present invention may be used on any tooth in the mouth of the patient. Further in vivo studies have shown that patients suffer less discomfort with the spring of the invention as compared with the usual prior art uprighting springs. The construction of the spring assembly of the invention also provides an indication for proper installation. That is, if the activating arm is engaging with the arch wire mesial of the tooth, the uprighting motion will bring the crown of the tooth to the mesial. This also applies to the distal engagement.

The uprighting spring assembly of the invention may be a single or dual type, as mentioned above. The dual type provides for the uprighting of two adjacent teeth simultaneously and provides an additional force for bringing these teeth into the open space between them. This is particularly useful in the Begg's Orthodontic Technique since in the majority of cases, the first premolars are removed leaving a space between the canine and the second premolar which must be closed. This action also permits the teeth to tip into the open space so uprighting is nearly always a requirement in such cases. Therefore, the dual uprighting spring assembly of the invention performs the function of two uprighting springs of the single type, an in addition to paralleling the roots of the teeth, serves to bring the teeth together.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1A** is a representation of a tooth uprighting spring assembly constructed in accordance with the the concepts of the invention and in an actuated condition;

FIG. **1B** is a view like FIG. **1A**, and showing the state of the tooth and spring assembly at the completion of the uprighting operation;

FIG. **2A** is a representation of a dual type spring assembly incorporating the concepts of the invention and operating on two adjacent teeth, the assembly being shown in its actuated condition in FIG. **2A**; and

FIG. **2B** is a view like FIG. **2A** and showing the condition of the teeth and of the dual type spring assembly of FIG. **2A** at the completion of the tooth straightening process.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

The single type of uprighting spring shown in FIGS. **1A** and **1B** is designated **10**, and it has a first end **10*a*** which extends into a slot in a bracket **12** which, in turn, is mounted on a band **14** extending around the tooth to be straightened. A usual arch wire **16** passes through the slot in the bracket **12**, and is held in the slot by the end **10*a*** of the spring **10**.

The spring has a helical spiral portion **10*b*** adjacent the end **10*a***, and it has an Archimedes spiral portion **10*c*** adjacent the other end **10*d*** of the spring, which other end is looped around the arch wire **16**, so as to provide the desired straightening and tipping action to the tooth.

As shown in FIG. **1B**, for example, the force exerted by the spring **10** on the tooth provides the desired uprighting movement. As mentioned above, the particular configuration of the uprighting spring of FIGS. **1A** and **1B** is such that the stress of spring rotation placed on the tooth is such that the pivot is in the longitudinal axis of the tooth so that the intendment of the aforesaid Begg's Orthodontic Technique is carried out.

The dual uprighting spring of FIGS. **2A** and **2B** is similar to the single spring described above, except that the uprighting of two adjacent teeth is provided simultaneously, and the additional force to bring the teeth together is also provided. In the latter embodiment, the dual uprighting spring is designated generally as **100**, the spring **100** has a first end **100*a*** which extends into the slot in the bracket **12** of the left-hand tooth, as in the previous embodiment, and it has a second end **100*b*** which extends into the slot in the second tooth.

A helical spiral **100*c*** is provided adjacent the first end and a similar helical spiral **100*d*** is provided adjacent the second end. The intermediate portion of the dual spring is looped into a spiral helix **100*e***. As shown in FIG. **2B**, for example, the result of the uprighting not only uprights the teeth with a true uprighting motion, but the stress is such as to move the roots of the teeth together, leaving the crowns touching at the end of the stage, as intended in the Begg Orthodontic Technique.

The invention provides, therefore, an improved orthodontic appliance in the form of an uprighting spring which provides true uprighting movements, and which serves to carry out faithfully the intendments of the Begg's Orthodontic Technique.

As described, the orthodontic appliance of the invention may be a single or dual type, and it is apparent that other modifications may be made. The following claims are intended to cover all the modifications which fall within the scope of the invention.

What is claimed is:

1. An orthodontic appliance in the form of a spring for tipping and uprighting teeth, and for use in conjunction with an arch wire and a bracket mounted on the tooth to be processed and which receives the arch wire in a slot therein, said appliance comprising:

a spring having a first end extending into said slot in said bracket, and said spring further having a helical spiral portion adjacent said first end, and in which said spring has a second end looped around the end of said bracket to form an Archimedes spiral between said helical spiral portion and said second end, and in which said second end is configured to engage the arch wire to provide the desired spring tension by the spring, so as to impart a stress to the tooth so as to pivot the tooth about a point in the longitudinal axis of the tooth.

2. An orthodontic appliance in the form of a spring for tipping and uprighting teeth, and for use in conjunction with an arch wire and a bracket mounted on the tooth to be processed and which receives the arch wire in a slot therein, said appliance comprising:

a spring having a first end for extending into said slot in said bracket, and said spring further having a helical spiral portion adjacent said first end, in which said spring has a second end for extending into the slot in a bracket in an adjacent tooth, and said spring further has a helical spiral portion adjacent said second end, and in which said spring has a looped portion intermediate the aforesaid helical spring portions and two relatively straight portions respectively extending between the intermediate looped portion and the aforesaid helical spiral portions.

3. The orthodontic appliance defined in claim 2, in which the intermediate looped portion has a helical spring configuration.

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